killed down to the surface of the ground. Here again growth becomes restricted to the axillary buds on these axillary branches. This continues from year to year, so that one branch is continually being placed upon the other, and each branch becomes limited to one year's growth. And when the result is an apparently continuous stem it is called a sympodium. *Polygonatum giganteum* has a sympodium. The stem of *Jeffersonia diphylla* Pers., is the product of the same sympodial development. The hibernaculum consists of a number of scales followed by a number of leaves, in the center of which, terminating the stem, is the flower-bud. This alabastrum is so highly developed as to have the complete advantage of the leaves, insuring its appearance and anthesis before the leaves have received sufficient nourishment to force their way to the air. In this way a similar result is produced to that noted in Anemone and Symplocarpus, where the placing of buds in axils beneath the leaf-bearing internodes, causes a like appearance of flowers before leaves.

Summary.—The list of plants has now been sufficiently extended to note the principal characters of hibernacula among perennial herbs.

The winter-buds of herbs consist of scales which owe their origin to different parts of leaves (blades, petioles)[1] as in trees. They never attain the indurated character nor the resinous properties of scales in arboreal vegetation, but like them are sufficiently protective to enclose the leaves and flowers of the following year and preserve them from the effects of a sudden change of weather. Unlike the hibernacula of trees, the inclosed parts begin to grow early in winter, and often break the bounds of their enclosures to develop and push their way up through the frozen soil. They are enabled to do this by the supplies of nourishment furnished by subterranean reservoirs in the shape of thickened stems or roots. The existence of such winter-buds, containing the flower-buds of the next season, is by no means rare.

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THE HAIR-SAC MITE OF THE PIG.

ABSTRACT BY PROF. R. RAMSAY WRIGHT.

IN view of the discovery of the hair-sac mite (*Demodex folliculorum*) in the pig in America, a synopsis of Dr. Csokor's paper may be of interest.

[1] The scales which envelop the sympodially arranged bud of *Geranium maculatum* are evidently dilated stipules.

After discussing the occurrence of hair-sac mites in man, the dog, the cat, the Surinam bat, and in the Meibomian glands of sheep,[1] he considers the question of the specific identity of the parasites in question, and especially the possibility of transference from one species of animal to another. He gives a synopsis of the various experiments which have been made to determine this point. Gruby succeeded in infecting a dog with the Demodex of man, and Zürn relates a case in which a veterinary surgeon, a coachman and his wife, who had the care of a dog suffering from

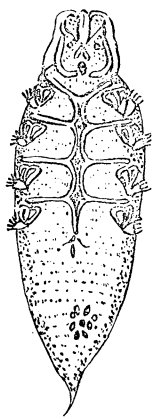

Fig. 1.

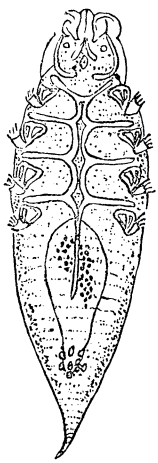

Fig. 2.

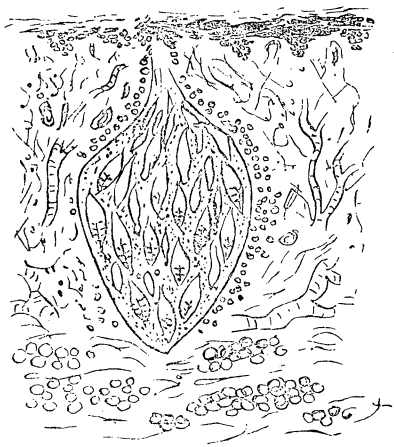

Fig. 3.

FIG. 1.—*D. phylloides* : male ventral aspect—the small fissure near the front of the ventral surface of the abdomen is the anus, in front of this two folds represent the penis. FIG. 2.—Female, ventral aspect—the abdomen contains an egg undergoing segmentation ; genital and anal fissure behind the sternum. FIG. 3.— Section of skin of pig, with sebaceous gland filled with mites; incipient inflammation.

Demodex-mange, had their hands and feet soon covered with pustules in which hair-sac mites were present.

On the other hand Rivolta endeavored, without success, to infect one dog from another, and Mortemucci failed to transfer the mites from one part of an affected dog's skin to another.

Again, doubtful results are recorded by Friedberger and Weiss. It is not infrequent to see dogs perfectly free from the skin disease living in the same kennel with affected animals, a circumstance which points to the conclusion that the conditions which favor contagion are often absent.

[1] He overlooks the observations of Gros and Haxon.

In no animals except the dog and the pig does the Demodex seem to cause any troublesome skin disease; in the dog, however, this is very generally fatal.

From purely zoölogical methods of observation, both Leydig and Megnin have come to the conclusion that the forms of Demodex described by them are at least different varieties, and the fact that the Demodex of man occurs in the least hairy parts of the body and is perfectly harmless, whereas that of the dog is found in the most hairy places, and may cause a fatal disease, seems to point to the non-identity of the two forms.

Dr. Csokor next treats of the natural history of the Demodex of the sow, and by a series of measurements defends its specific distinctness. He sums up his table of dimensions as follows:

1. *D. phylloides* only reaches the minimum length of *D. canis*, never that of *D. folliculorum*.

2. The length of the abdomen in relation to that of the whole body is in *D. phylloides* ½, *D. canis* ⅓, *D. folliculorum* ¼.

3. The relation of the breadth to the length is comparatively twice as great as in the other forms.

4. The appendages of the mouth are more robust and thus easier to study.

5. The egg is larger and is rather oval than fusiform; the six-footed larva is also larger than in the other two forms, while the eight-footed larva is larger than that of *D. canis*, but smaller than that of *D. folliculorum*.

6. The differences between *D. phylloides* on the one hand, and *D. canis* and *D. folliculorum* on the other, are of much greater extent than the difference between the two latter varieties.

After describing the regions of the body, he calls attention to the cuticle and the chitinous pieces which strengthen it. The transverse furrows on the abdomen (which is produced into a sharp point posteriorly) are shallower towards the thorax; he considers these as traces of segmentation. On the middle ventral line of the thorax is a chitinous ridge which gives origin to four pairs of transverse bars, to the outer thirds of which the appendages are movably articulated; the first pair of transverse bars separates the thorax from the head completely. The appendages are three-jointed, the basal joint being three-sided; they are terminated by five claws, of which two appear to belong to the second joint and three to the distal.

The following are the appendages attached to the cephalic segment:

1st. A pair of mandibles seen best from the dorsal surface and resembling a pair of scissors of which both the blades are terminated by blunt points.

2d. A pair of maxillæ which lie in a depression on the under surface of the cephalic segment.

3d. A pair of pedipalpi which are three-jointed, the middle joint being soft while the last bears three incurved hooks.

4th. An unpaired stylet seen only from the ventral surface between the maxillæ, which appears to be connected with the pharynx.

The appendages of the mouth move chiefly horizontally, and are therefore of a masticatory nature, but the closed maxillæ form a sharp point anteriorly and thus form a piercing organ.

Some interesting particulars are given as to the development of the cephalic segment and its appendages. The clear anterior end of the egg is rounded off as the head segment, and already the pedipalpi and the future eyes may be seen; the depression between the pedipalpi is then occupied by the outgrowth of a pyramid which by a cleft in the middle line and a further longitudinal division of each of the resulting halves is converted into the mandibles externally and the maxillæ internally.

The pharynx is lined with chitin, and a short œsophagus leads from it to the stomach, which occupies the greater part of the thorax and which is seen in optical section to possess a wavy contour. Csokor considers this to be due to gastric cœca such as are generally present in the Arachnida. The short intestine opens on the ventral surface behind the sternum in a fissure, which is twice as long in the female as it is in the male.

A group of refractive particles in the end of the abdomen are interpreted as urinary concretions; they are to be traced also in the earlier stages of development.

In stained specimens a rudimentary tracheal system is to be detected from the dorsal surface, composed of two longitudinal canals running back as far as the last pair of legs. These canals have a few branches and may possibly open on the exterior by certain little protuberances which have already been described by Leydig and Megnin.

Two little crescentic bodies, further back upon the dorsal surface, are interpreted as rudimentary circulatory organs.

Csokor has studied the locomotion of the mites in a drop of oil on a hot stage, and finds the movements which are, at the ordinary temperature, so sluggish, become then so energetic that he considers the want of success of various experiments as to infection to be due to the absence of a sufficiently high temperature. He calls attention to the fact that the disease has been rapidly spread over the surface in a dog by the use of warm water in washing affected spots, and that probably also the raising of the temperature of the skin by the rubbing in of ointments may contribute to the spreading of the parasite. He found that the pedipalpi are particularly active in locomotion, and are able to bore into a soft surface.

Only the two terminal joints of the legs take part in locomotion; the head may be moved from right to left and also upward and downward—the combination of these movements resulting in a rotation of the head upon the thorax. The abdomen may be also flexed against the thorax in very active locomotion.

The eyes, which appear very early in development, are destitute of pigment in the adult, and are situated upon the dorsal surface near the mandibles.

The male is shorter than the female; the appendages of the mouth are less developed; the abdomen is less than half the length of the body; between the anal opening and the end of the sternum are two curved chitinous pieces which represent a penis.

The female is at once distinguished by the longer abdomen and the three-sided structure which it contains, and which is eventually discharged through the fissure behind the sternum as the egg; the oviposition has been observed by Megnin.

Csokor has traced the occurrence of three molts, the first between the egg and the six-footed larva, the second between the six-footed and the eight-footed larva, the third between the eight-footed larva and the adult.

Csokor concludes his observations by describing the mode of occurrence of *D. phylloides* in the pig; it is found in the sebaceous glands right and left of the snout, and on the neck, flanks and ventral surface and especially on the internal surface of the extremities, while the back and sides are free from the attack. The hair-follicles in these localities are only accessory to the sebaceous gland. Fig. 3 represents a section through an affected

gland. The cast-off cuticles are found toward the center of the knots formed by the mites while the adult individuals occupy the periphery, their heads being directed towards the bottom of the gland. He considers that the habits of the pig would render contagion easier than in other animals, and thinks that had the swine he examined not been killed, the result of the disease would probably have had as fatal an issue as is generally observed in the similar disease in dogs.

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THE GEOLOGY OF CENTRAL AUSTRALIA.

BY EDWARD B. SANGER.

THE geology of the great central basin of Australia has until recently been a matter of some uncertainty. From analogical reasons conclusions have been formed which are more or less correct. Still at best they were but shrewd guesses. Our knowledge has been of a limited kind. The various explorers who have ventured to cross the continent have seldom taken any scientific men with them. Hence the reports received from time to time of this *terra incognita* have been vague and conflicting. Australia nevertheless has had not a few advantages in its scientific history. Many men of science whose reputation is now world wide, first became known to fame by their work on Australian shores. But the attention of naturalists has been restricted, for the most part, to the east coast of the continent, while the remainder has been comparatively neglected. This, to a certain extent, was unfortunate, as the east coast possesses the novel Australian features in the least degree. It shares its peculiarities with other approximately well-known regions. Thus on the north-east coast there is a large intermixture of Asiatic characters. These are less marked as the coast is followed to the southward, but still there is a large proportion of forms belonging to the Pacific islands, New Zealand, &c. On the south coast, however, the case is different. Here the flora and fauna are peculiarly Australian. The physical differences between Sydney harbor and Melbourne are slight, but according to Tenison-Woods, the marine fishes are of different species. The geological structure of the south and east coasts also differs widely.

Taken in its totality Australia is built on the true continental model. It has the characteristic elevated borders and the de-